

DRAFT LANDFILL GUIDANCE

Basis of Project

Guidance is provided herein regarding the placement and grading of waste and soil at the Present Landfill of the Rocky Flats Plant. This guidance will cover the disposal of waste and soil that will be placed during the next two to three years of operating life of the landfill. The purpose of the guidance is to direct the sanitary waste disposal operations to be most environmentally acceptable and to minimize the costs associated with final cover grading. The guidance for operations has also been designed so that minor deviations from the proposed guidance can be accommodated by the final cover grading with a minimum of effort and expense.

The Rocky Flats Plant needs to provide for waste disposal until the new landfill currently being sited is operative. It is assumed that the new landfill should be operative no more than 3 years from now, November 1990. The current landfill has reached a level approximately equivalent to the surrounding land elevation. Until recently this is the level that has been assumed to be the final contours of the landfill. However, no detailed design for landfill closure exists in the engineering design drawings. A cap/cover configuration was proposed in the 1988 RCRA Closure Plan, but the current configuration of the landfill makes the implementation of that proposed design impractical. In addition, the 1988 Closure Plan has been superseded by the Interagency Agreement. Therefore, the following guidance has been prepared for operations for the next three years.

Conceptual Design

The final elevations of the landfill will consist of a an east-west oriented mound/ridge traversing the center of the landfill to provide for drainage of incident precipitation. Runoff will drain into the perimeter ditches that surround the landfill and consequently drain the water away from the landfill to the landfill pond. Final landfill slopes for drainage should be no less than 2% (to provide for drainage) and no greater than 25% (to prevent erosion). The top of the mound/ridge will be approximately 8 feet above existing elevation. The minimum slopes cited above are acceptable from an engineering perspective since the final cover will incorporate a flexible membrane liner (FML).

In order to achieve these final slopes, soil/waste on the order of 88,900 cubic yards is needed. The majority of this volume will need to be soil imported for this use because waste disposal in the next three years will only provide approximately 20,000 cubic yards of volume.

Operations for the next three years can continue at the eastern end of the landfill and proceed in a westerly direction as the filled area approaches final contours. Alternatively, a berm can be constructed at the far west end of the landfill and filling proceed to the east. Filling will take place directly on top of the

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existing interim cover which is extant on the landfill where fill operations are not currently taking place.

The eastern face/slope of the landfill is currently too steep. These slopes may erode, and final cover could require considerable maintenance and expense. Therefore, it is necessary to reduce the slope angle on the eastern face and transfer materials to the west where they are needed to provide fill. The slopes should be overcut one foot, graded and then provided with an interim cover.

The attached figures briefly outline the existing conditions, proposed slope changes on the eastern landfill face/slope, contours following three years of waste disposal and contours of the final cap/cover.

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LIST OF FIGURES

Figure 1, Existing Landfill Elevations: depicts the current configuration of the active area of the landfill.

Figure 2, Proposed Changes in Eastern Elevation (Near-Term): depicts the proposed changes on the eastern face of the landfill to prevent erosion.

Figure 3 - Contours After 3 Years Filling: depicts the proposed elevations achieved with disposal of expected waste quantities in the next three years.

Figure 4, Proposed Final Contours: depicts final landfill elevations in conjunction with the final landfill cover.

Figure 5, Proposed Final Cover Section: is a cross-section of the proposed final cover.

BASIS OF DESIGN

Waste Generation

Current estimates of sanitary waste generated at the RFP are from 30 - 60 "uncompacted" cubic yards per working day. For the evaluation of capping, an estimate of 40 cubic yards per working day will be used in the calculations.

An estimated density of 450 pounds per cubic yard will be used for the uncompacted waste. This number is typical of sanitary waste collected and disposed at sanitary landfills.

Expected Life of Landfill

A new landfill is being sited at the Rocky Flats Plant. This landfill may be ready to accept waste in the 1992/1993 time-frame. Therefore, to be conservative and provide for capacity that may not be used, a three year life for the landfill will be assumed at this time (all of calendar year 1991, 1992, 1993).

Landfill In-Place Refuse Density

An estimate of 1100 pounds per cubic yard in-place density will be used for waste placed in the landfill (Brunner, et al., 1972). This is a realistic number given the fact that the RFP has a landfill compactor.

Waste-to-Soil Ratio

The waste-to-soil ratio is probably on the order of 3/1 to 4/1 (Brunner, et al, 1972). Based on historical and present knowledge of operations at the RFP landfill, a conservative (maximized volume) assumption of a 2/1 waste-to-soil ratio will be used.

Volume Calculation

The volume needed for waste disposal at the landfill is:

$$450 \text{ \#/cy} \times 40 \text{ cy/dy} \times 5 \text{ dy/wk} \times 52 \text{ wk/yr} \times 3 \text{ yr} \times 1 \text{ cy/1100\#} = \\ 12,764 \text{ cy}$$

1/2 soil to cover ratio:

$$12,764 \text{ cy} \times 1.5 = 19,145 \text{ cy total capacity needed}$$

So, 19,145 cy of total capacity is needed.

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Slopes

The final cover for the landfill will be designed and graded in a manner that promotes runoff and minimizes infiltration. Typical slopes for final grade can vary from as little as 5% slope, to a maximum of 33% (Lutton, 1982) and still provide for efficient runoff and prevent erosion of the final cover. Normally, slopes of more than 25% are avoided (Lutton, 1982). Recent EPA guidance (EPA 1989) recommends that final slopes should be in the range of 2% to 5% with variations allowable based upon specific facility conditions. Some references, Tchobanoglous, et al, 1977, allow slopes as little as 2% with clayey soils. Due to the semi-arid nature of the Denver areas, and due to the use of a flexible membrane liner in the final cover, 2% minimum slopes should be acceptable. If steeper slopes are needed, they can be provided for during final cover construction through the placement of larger volumes of soils, and constructing higher final elevations.

Area of Operations

The landfill covers an area of approximately 25 acres, but only about 33% of that area is used for active operations. The area of active operations is located at the eastern portion of the landfill near the landfill pond. It is recommended that operations continue in the currently utilized portion of the landfill area as much as possible.

Runoff

During landfill operations the collection and proper management of the runoff from the landfill is required (6 CCR 1007-3, 265.302). Precipitation at the landfill currently either percolates through the landfill or runs-off into the landfill pond east of the landfill. Operations for the next three years will continue to manage runoff in a similar manner. Operations will remain separated from the perimeter surface water ditches to avoid the movement of runoff away from the landfill.

The collection and treatment of runoff after final closure and final capping of the landfill is not required. Therefore, the suggested final contours will drain the majority of runoff to the perimeter surface water ditches rather than draining to the pond. The sampling and analysis of initial runoff from the landfill would be prudent in order to prove that the runoff is uncontaminated.

Interim Cover

The proposed design includes an allowance for the placement of an interim cover on all portions of the landfill in which waste disposal operations will not take place for over one year. An interim cover is used to provide for separation of the waste from the environment, and to allow for settlement of the waste materials. As settlement of the landfilled waste takes place, the

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interim cover must be maintained for protection of human health and the environment. The existing interim cover on the western portions of the landfill will provide the base for disposal operations for the next three years. As disposal operations reach a level of one foot less than the interim grade (Figure 3), interim cover should be placed. The interim cover is an additional layer of one foot of compacted soil placed over daily cover. The final cover will be placed directly over the interim cover.

Final Cover

The final cover at the Present Landfill will be a hazardous waste landfill-type multi-layer cover (EPA, 1989). The currently anticipated minimum thickness is four feet. This cover incorporates all layers proposed for inclusion by the EPA, but deviates in some minor points from the guidance. These deviations are due to:

- the semi-arid nature of the Denver area,
- the sparse vegetation that is anticipated on the cover, and
- the placement of the final cover directly over the interim cover.

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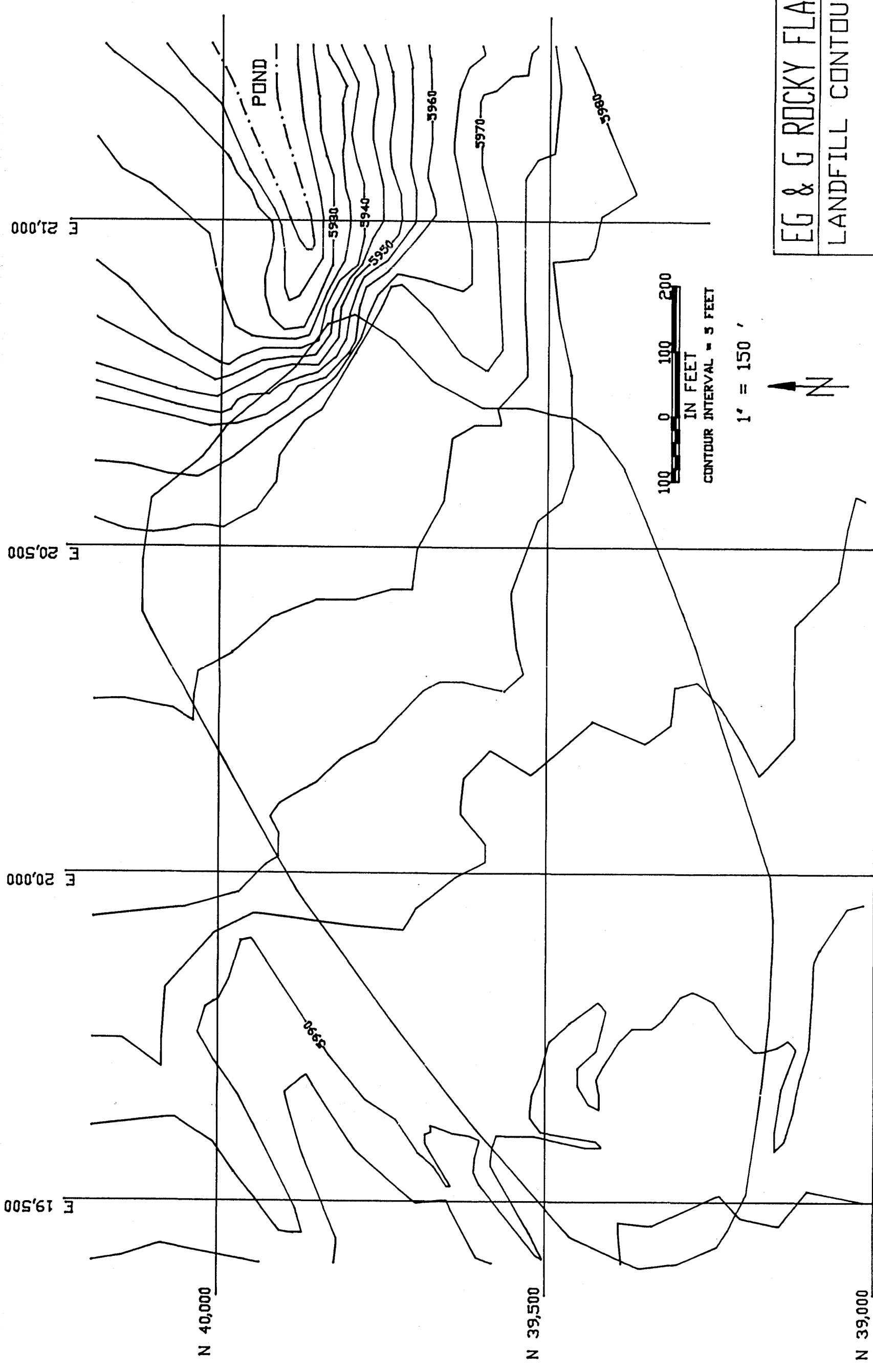
REFERENCES

Brunner, Dirk R., Daniel J. Keller, 1972, "Sanitary Landfill Design and Operation," U.S. Environmental Protection Agency, PB-227 565.

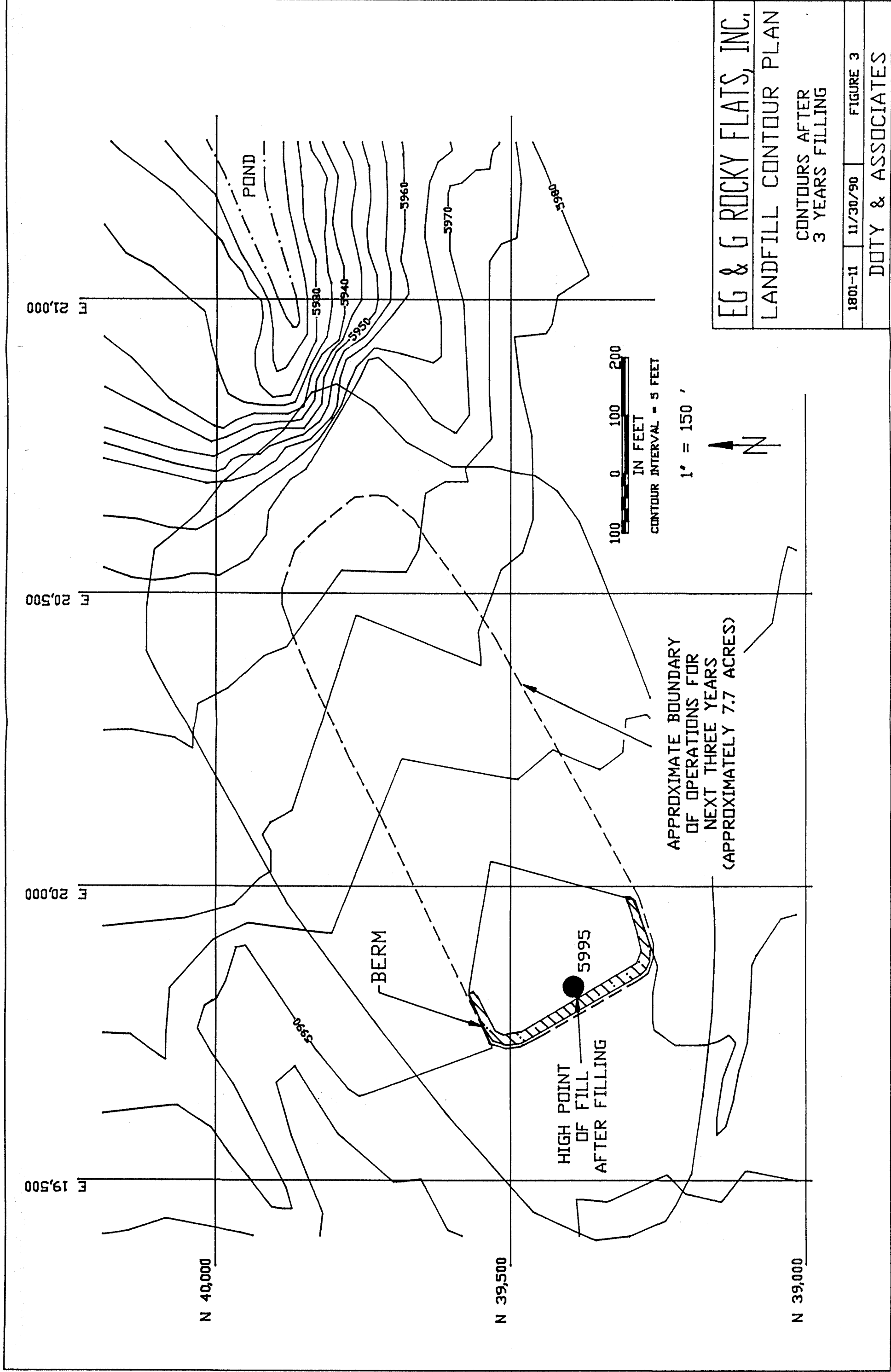
EPA, 1989, Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530-SW-89-047, July.

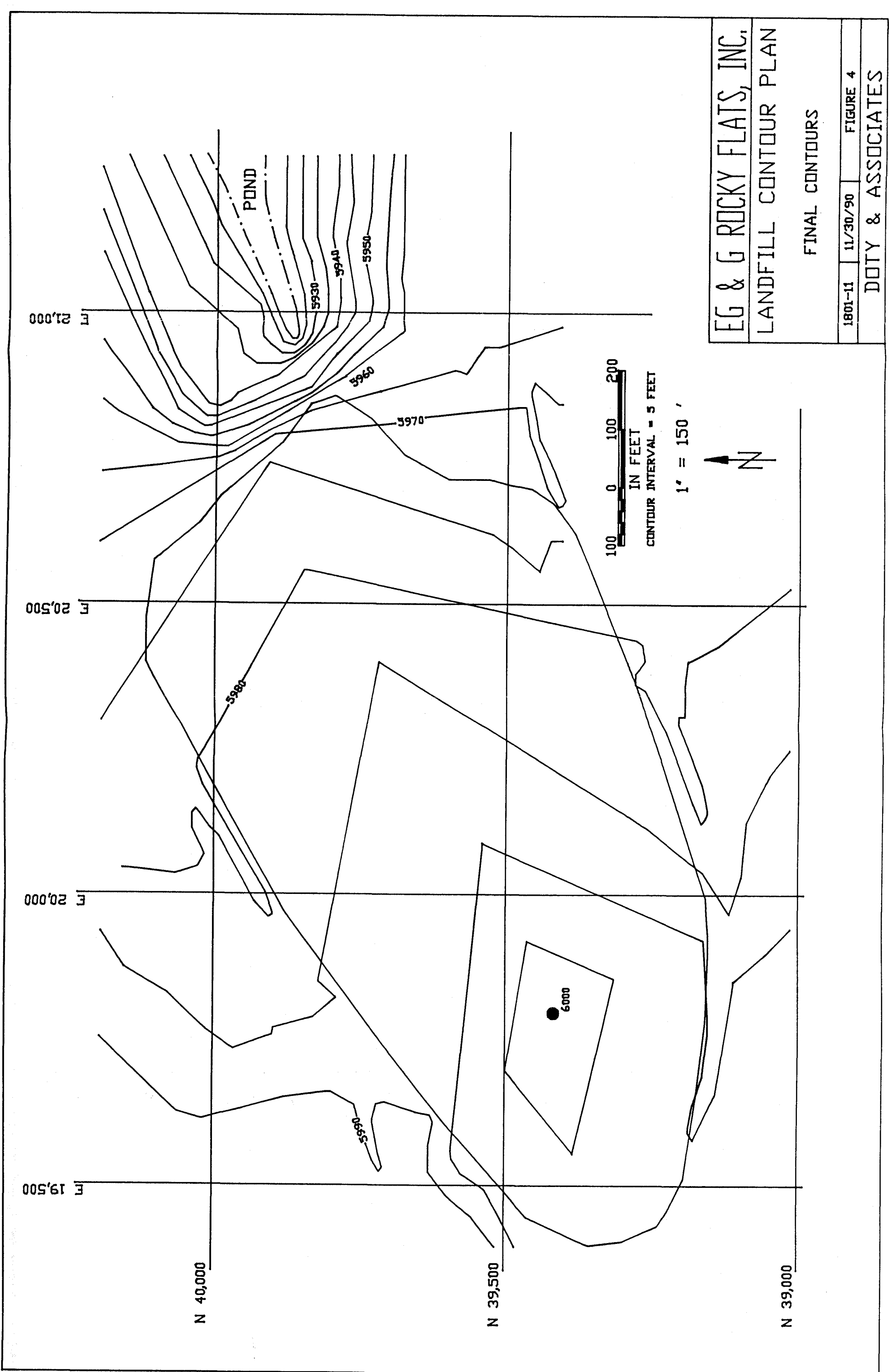
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Tchobanoglous, G., Hilary Theisen, Rolf Eliassen, 1977, Solid Wastes, Engineering Principles and Management Issues, McGraw-Hill Book Company.



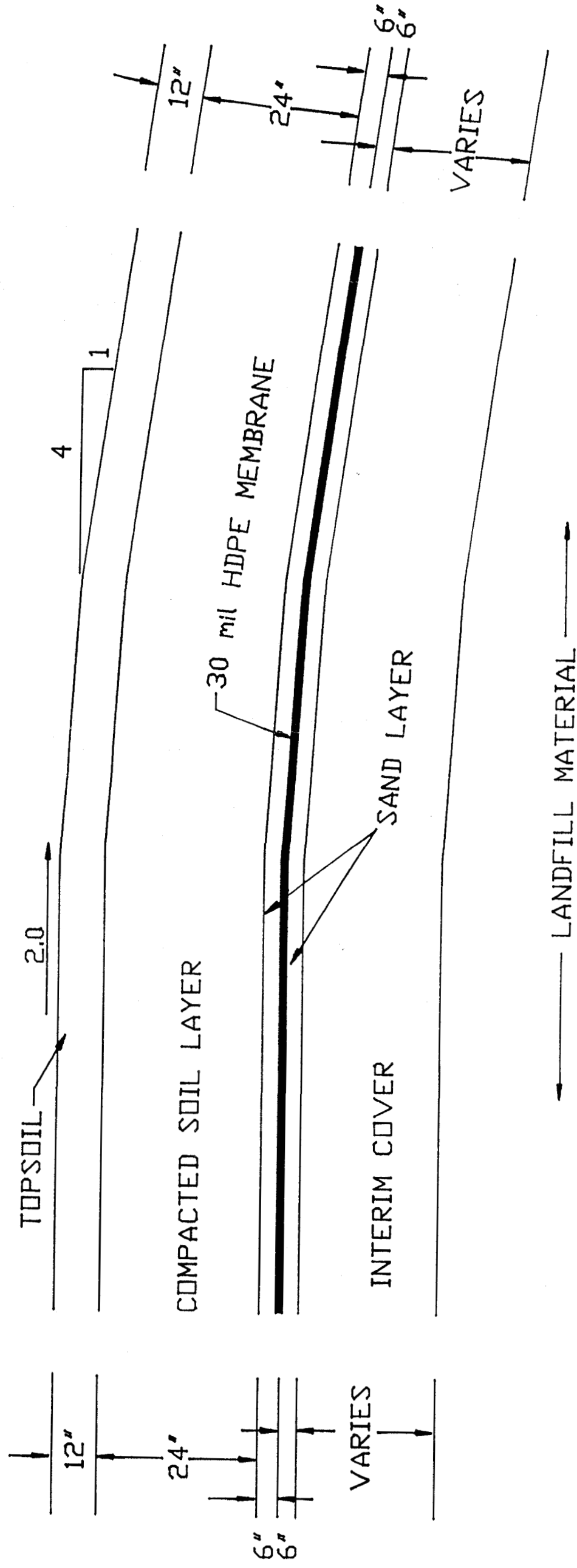
EG & G ROCKY FLATS, INC.	
LANDFILL CONTOUR PLAN	
PRESENT CONTOURS	
1801-11	11/30/90
FIGURE 1	
DOTY & ASSOCIATES	





EG & G ROCKY FLATS, INC.,
LANDFILL CONTOUR PLAN
FINAL CONTOURS
1801-11 11/30/90 FIGURE 4
DOTY & ASSOCIATES

FINAL COVER - VEGETATIVE AREAS



EG & G ROCKY FLATS, INC.		
LANDFILL CONTOUR PLAN		
FINAL COVER VEGETATIVE AREAS		
1801-11	11/28/90	FIGURE 5
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